

## CLAIMS

What is claimed is:

1. A method for assigning a set of predetermined  
lightpath connections between nodes to wavelengths  
in a wavelength-division multiplexed optical ring  
communications network, comprising the steps of:

(a) determining whether a subset of the  
lightpath connections exists so that each  
of the nodes includes exactly one of an  
origination for one of the lightpath  
connections, a termination for one of the  
lightpath connections, and a traversal of  
one of the lightpath connections;

(b) assigning said subset determined at said  
step (a) to one of the wavelengths;

(c) removing said subset determined at said  
step (a) from said set of lightpath  
connections; and

(d) repeating said steps (a)-(c) until no more  
of said subsets are determined to exist.

2. The method according to claim 1, further comprising  
the steps of:

(e) determining whether any of the wavelengths  
do not have any of said lightpath  
connections assigned thereto;

(f) determining whether any of said lightpath  
connections remain in said set;

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- (g) selecting one of said lightpath connections determined to be remaining in said set at said step (f);
- 5 (h) moving said one lightpath connection selected at said step (g) to one of the wavelengths determined not to have any assigned lightpath connections at said step (e); and
- 10 (i) repeating said steps (e)-(h) until no more of the wavelengths are determined not to have any assigned lightpath connections at said step (e).
3. A method for assigning a set of predetermined
- 15 lightpath connections to wavelengths in a wavelength-division multiplexed optical ring communications network, comprising the steps of:
- (a) selecting one of the predetermined
- 20 lightpath connections from the set to form a linked component group bounded by an originating node and a terminating node;
- (b) removing said lightpath connection selected at said step (a) from the set;
- 25 (c) examining whether at least one of said lightpath connections remaining in said set either terminates at said originating node or originates at said terminating node;

- 5 (d) when at least one lightpath connection exists at said step (c), determining whether said at least one light path connection traverses any portion of said linked component group;
- 10 (e) when at least one lightpath connection is determined not to traverse any portion of said linked component group at said step (d), selecting one said lightpath connection to expand said linked component group to have either a different terminating node or a different originating node;
- 15 (f) removing said one lightpath connection selected from said set at said step (e);
- (g) repeating said steps (c)-(f) until no more of said lightpath connections are selected at said step (e);
- 20 (h) assigning a wavelength to said linked component group when no more of said lightpath connections are selected at said step (e); and
- 25 (i) repeating said steps (a)-(h) until no more lightpath connections remain in the set.

4. The method according to claim 3, further comprising the steps of:

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- 5 (j) determining whether any of the wavelengths do not have any lightpath connections assigned thereto;
- (k) finding one of said lightpath connections isolated from said linked component group;
- 10 (l) moving said one lightpath connection found to be isolated at step (k) to one of the wavelengths determined not to have any assigned lightpath connections at said step (j); and
- (m) repeating said steps (j)-(l) until no more lightpath connections are found to be isolated at said step (k).
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5. The method according to claim 3, wherein said step (e) further comprises selecting the longest one of said lightpath connections which may be connected to said linked component group.
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6. The method according to claim 3, wherein said step (e) further comprises selecting one of said lightpath connections which result in a minimum number of connected lightpath components after removal of said one lightpath connection.
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7. The method according to claim 3, wherein step (e) further comprises selecting ones of said lightpath

connections that minimize fragmented lightpaths from said linked component group.

- 5        8.    A method for analyzing predetermined lightpath arcs  
in a wavelength-division multiplexed optical ring  
communications network to form complete lightpath  
circles around the ring, comprising the steps of:
- 10        (a)   forming a partial circle from the predetermined  
lightpath arcs;
- 15        (b)   iteratively identifying complete lightpath  
circle subsets of lightpath arcs which have  
been determined to form a complete lightpath  
circle from said partial circle;
- 20        (c)   removing the lightpath arcs of each said  
complete lightpath circle subset from the  
remaining ones of the predetermined lightpath  
arcs; and
- 25        (d)   repeating said steps (a)-(c) whenever one said  
complete circle subset is created until no more  
of said complete lightpath circle subsets are  
identified at said step (b).
9.    The method according to claim 8, wherein said  
lightpath arcs comprise lightpath segments around  
the ring.

